

# **RETURN TO THE LUNAR SURFACE**

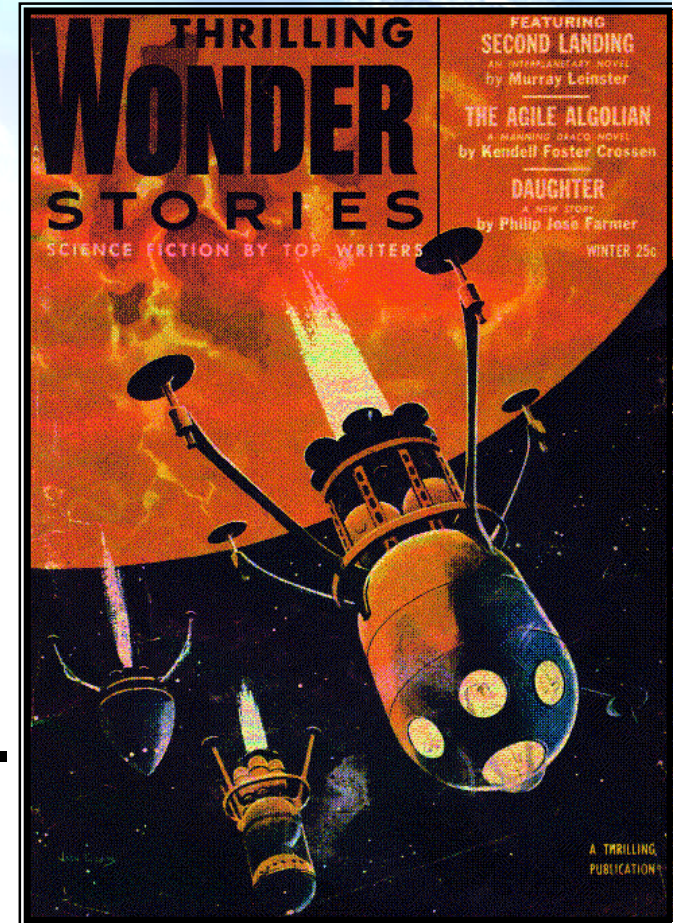
## **Lunar Exploration Campaign**

# **NASA Lunar Science Conference Entrepreneurial and Commercial Opportunities**

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## Executive Overview

- Growing interest in early missions to moon with small landers
  - Science, technology validation / risk reduction
- Growing interest in increased commercial/international involvement in NASA Vision.
- Emerging low-cost, lunar commercial missions



# RENEWED INTEREST IN THE MOON

## Commercial Interest



- Market Supply side - transportation
  - GLXP: Astrobotic Tech, Odyssey Moon, Quantum 3, others
  - ATK: Lunar Launch/Landing Services
- Market Demand side – transportation
  1. Commercial users/entrepreneurs
    - Communication nodes and infrastructure
    - Power and mobility infrastructure
    - Cargo transport services
    - Entertainment and education
    - Observatories
  2. NASA – Science
  3. NASA – Applied science, plus technology risk mitigation
  4. Internationals
  5. Other government agencies

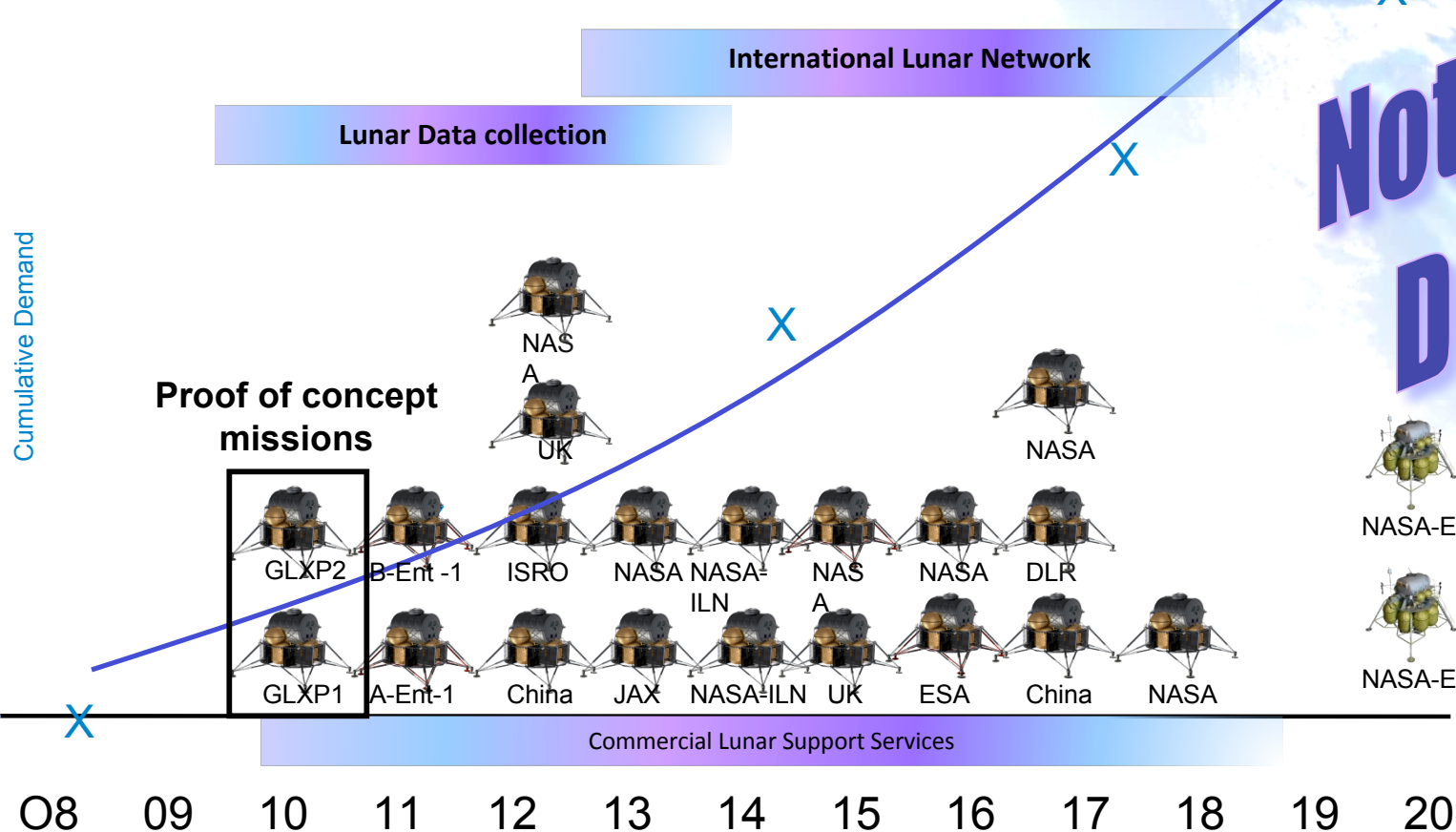




# Lunar Payload Service/Data Demand Commercial + International + NASA (notional)

Entrepreneurial Missions Must Start Early to Capture Demand

Notional  
Draft

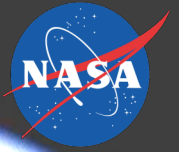


Note: ENT missions not counted

Cumulative Missions	2	4	8	10	12	14	16	19	21
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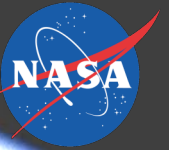


# ESMD Technology Development Program (ETDP)



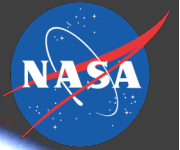
- **Category 1 – Landing, Communications, Environments**
  - validating technologies that would be used in lunar landing
  - demonstrating communications equipment on the moon
  - understanding dust, ground truth and radiation environments
- **Category 2 – Design of materials**
  - assessing the effects of the lunar surface environments on materials and components.
  - assessing ISRU capabilities.
- **Category 3 – Prototype Systems**
  - demonstrating system-level capabilities over long periods: storable cryos, surface mobility, oxygen production, power generation, etc

# COMMERCIAL LUNAR TRANSPORTATION SYSTEM OF PAYLOAD DELIVERY & DATA BUY (LUN-EX)



- **Small (\$100M)**
  - Small launch vehicle - few kg up to 100+ kg
  - Medium-class launch – 300-400kg
- **Frequent, multiple flights**
- **Commercially-leveraged: Open Competition for lunar transportation services and data-buy**
- **Fixed price service**
- **NASA Class-D type mission portfolio**
  - Similar to LCROSS
- **Industry provide the “Fed-Ex” to the surface**
  - “*LUN-EX*”

# Next Steps



- **Complete integration of NASA's lunar "needs" :**
  - Develop time-phased, integrated NASA-needs list for science, applied science, technology
- **Assessment industry interest (RFI)**
- **Identify funding to begin meeting those needs**
  - for data-buy, NASA payload development and delivery
- **Mature the NASA acquisition strategy**
  - Lunar Data-Buy approach / Lunar Service-Buy approach



# Commercial Lunar Payload Delivery.... GOING FORWARD



- Enabling earlier lunar access to the surface.



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